

Biodiversity in a Changing World



CONSERVE WILDLIFE
FOUNDATION OF NEW JERSEY

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What is Biodiversity?

The variety of life at all its levels, from genes to species to natural communities.....
and the ecological and evolutionary processes that sustain it.



Biodiversity is the variety of life on earth. It includes both common and rare species and it is important to always remember the “little people” the microbes, bacteria, and not so charismatic species.

Biodiversity is reflected in the variety of ecosystems and species, their processes and interactions, and the genetic diversity within and among species. The sheer variety of species on Earth from microscopic bacteria to blue whales is impressive on its own. But biodiversity isn't limited to the numbers and kinds organisms. It also includes Earth's ecosystems – savannas, rainforests, oceans, marshes, deserts, and all the other environments where species evolve and live.

Biodiversity

- The variety of life on earth
- Includes both common & rare
- Three levels of biodiversity:
 - Genetic
 - Species
 - Ecosystem

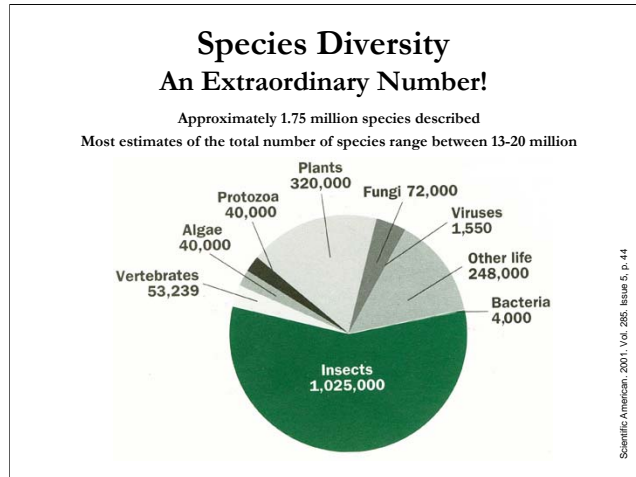


Biodiversity surrounds us

Genetic diversity includes all the different genes contained in all individual plants, animals, fungi, and microorganisms. It occurs within species as well as between species. A good example of genetic diversity is domesticated dogs. They are all *canis lupus familiaris* but there are so many different breeds that have been genetically altered to bring out certain traits. Also think about the different varieties of tomatoes, peppers, and other vegetables.

Species diversity (what I will spend the majority of time on) at the organism level – the variety of different species that exist.

Ecosystem diversity there is a diversity of landscapes on this earth because of geology, latitude, climate and this determines what species will exist there.



There are almost 2 million species that have been described by scientists. Most of them insects. But what remains to be discovered is what is truly amazing – scientists believe that the total number of species that exist is somewhere between 13 and 20 million. We have just scratched the surface in identifying what exists on this planet.



Now when you think of biodiversity your minds probably turn to far away places like the rainforest or the savanna

But NJ has a huge amount of biodiversity that belies our small size and urban nature

A biological crossroads



Northerners at their limit

- Northern goshawk
- Blue spotted salamander

Southerners at their limit

- Allegheny woodrat
- Pine Barrens treefrog
- Eastern tiger salamander
- Southern grey treefrog
- Aregos skipper



New Jersey's location also makes it a biological crossroads. means that it has some plants and animals that are at the northern most extent of their ranges and some that are the southern most extent...

our unique geographic location provides

Northern Goshawk and Blue spotted salamander find their southern most range here in NJ.

Allegheny woodrat, PB treefrog, s. grey treefrog can only be found south of NJ.



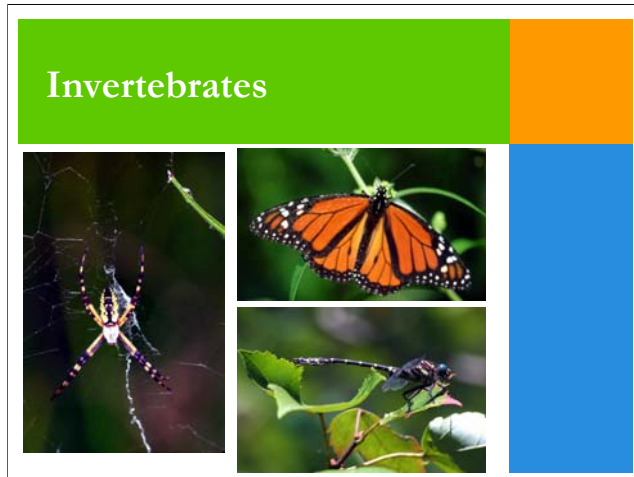
Over 300 species of birds migrate, breed, or live in New Jersey for some part or all of the year.



New Jersey has over 70 species of reptiles and amphibians.



Over 90 mammals are permanent or part-time residents.



Including invertebrates in New Jersey's species biodiversity count you would quickly reach 1,000's of species living in our small state.

Some of these species of bird, mammal, reptile and invertebrate fall into a special category - that of protected species, those that are listed by the state or federal government as being threatened or endangered with extinction or extirpation (extinct in a particular area but not across its entire range)



NJ has a vast diversity of habitat that supports our vast biodiversity. In fact, very few states can offer the breadth of habitat types that New Jersey offers and that supports the breadth of wildlife in the state....

Our coastal and freshwater marshes, Pinelands, Highlands, Forests, Beaches, etc.

ENDANGERED



ALSO
endangered
in NJ

Henslow's Sparrow
Sedge Wren
Red-shouldered Hawk
Bog Turtle
Bobcat
Mitchell's Satyr
Appalachian Grizzled Skipper

Now some of the species that reside in our state are considered endangered.

An endangered species is an animal or plant that occurs in such low numbers that it may become extinct.

In New Jersey, there are about 47 endangered species and 20 of these species also have federal protection.

Some of NJ's endangered species include the very well known bald eagle. Other less known species include those listed here.

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THREATENED



ALSO
threatened
in NJ

Black Rail
Pine Barrens treefrog
Red Knot
Corn Snake
Long-tailed salamander
Red-headed woodpecker

A threatened species is one that may become endangered if precautions are not taken. There are about 30 species in NJ that are considered threatened. Like the barred owl...

Other NJ Species considered threatened include those listed here.

How does this happen?

*How do species become
threatened and endangered?*



There are many reasons that species are becoming threatened with extinction. There are many reasons that our biodiversity is threatened.

...habitat loss...



But anywhere in the world, the number one reason species are becoming extinct is due to habitat loss.

New Jersey is no different...

In New Jersey, with its recent history of sprawling development, habitat loss and fragmentation are the largest threats to our wildlife.

Mainly...land use...



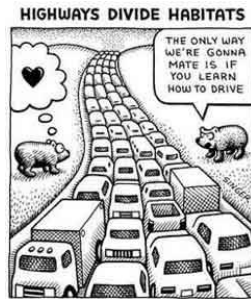
In the simplest terms, development can destroy habitat - you build a shopping mall or a road or a house and you destroy habitat.

Have you ever wondered what happens to wildlife when their habitat is destroyed? Some animals run or fly away and squeeze into other habitat. Some try and squeeze into adjacent habitat that maybe is not as abundant as their former home. Since these animals now live so close to humans, these animals run the risk of getting hit by cars or eaten by predators. Some animals may even die outright, crushed by a bulldozer or killed by a hawk. Those that can escape do so sometimes flying away and never coming back.

Poorly planned development can also degrade habitat - poor storm water control, poor choice of building material etc.,

Poorly planned development can also fragment habitat, which in some cases is synonymous with destroying it as species need to be able to move to migrate, hibernate and breed -

...sprawling development...



In the simplest terms, development can destroy habitat - you build a mall, you destroy habitat.

Poorly planned development can also degrade habitat - poor storm water control, poor choice of building material etc.,

Poorly planned development can also fragment habitat, which in some cases is synonymous with destroying it as species need to be able to move to migrate, hibernate and breed - fragmenting habitat stops species from moving and decreases their chances of success.

...and human disturbances



Other human activities can harm wildlife:

Illegal ORV use, especially in a sensitive ecosystem like the Pinelands, can do great damage. 80% of the species grow in wetland areas ORV do great damage in wetland areas

Driving on beaches is detrimental to many of our beach nesting birds. Drivers don't see the nests or the young birds and can accidentally crush the eggs and chicks.

Even people out for a nature walk or observing wildlife can unintentionally hurt wildlife. If approached too closely, Most animals react with alarm. Prolonged or repeated disturbances may cause wildlife to avoid or abandon an area, even if the area provides the best food and nesting sites.

Humans are the greatest threat to biodiversity.

Other Threats to Biodiversity

- Poaching & Illegal Collecting
- Global Warming & Climate Change
- Pollution
 - Light pollution
 - Noise Pollution



Scientists say we are in the midst of the 6th major mass extinction and human action and intervention is to blame.

So...What do WE do?

- Research
- Recovery plans
- Restoration efforts
- Species management



To help species of wildlife maintain numbers or recover numbers, we approach the situation from a number of different angles.

To help preserve and protect NJ's biodiversity – nj wildlife specifically, we approach it from a couple of different angles.

In order to determine whether a species requires protection, we carry out research.

Once we have determined that a species requires further help, we develop recovery plans, implement restoration efforts and manage populations when we can.

These management initiatives also include education and communication to make sure that the public understands and supports our actions and we also work hard to make the state better at looking after our wildlife.

RESEARCH

Case Study: Red Knot



CWF partners with NJ ENSP on the red knot. CWF funds the international study of this bird.

The red knot is not a federally listed species...i.e. it is not yet protected by federal laws but its numbers are declining at a rate that its extinction is estimated by 2015.



The red knot is a shore bird that migrates over 20,000 miles from its wintering grounds in Tierra del Fuego, Chile to their breeding grounds in Canadian Arctic. It's vital stopover in New Jersey, on the Delaware bayshore is crucial to its survival on its long migration north.



When the red knot arrives at its stopover on the Delaware bayshore, it needs to gain sufficient weight to carry it to the Canadian Arctic. Once in the Arctic the red knot does not feed until it has established a nesting area and laid its eggs.

The main source of nutrition for these birds are the eggs laid by the horseshoe crab in their annual reproduction - these eggs are nutritionally adequate for the birds' needs but, more importantly, they are easy for the birds to swallow and digest.

Every spring at a full moon high tide, the crabs lay their eggs on the highest reaches of the beaches in depressions in the sand. The birds then feed on the exposed eggs.

Horseshoe crabs are harvested as bait and overharvesting of the crabs has led to a decline in their numbers and a subsequent decline in the number of eggs available to the birds. If the birds do not get enough nutrition, they either cannot make it to the Arctic or they fail to breed once they arrive.

Case Study: Red Knot



Our biologists travel to Tierra del Fuego during the Austral summer to count, resight, trap and band these birds. They then follow them to NJ, along the Delaware bayshore where they do the same thing and then up to the Canadian Arctic to track birds to learn more about how the population interacts and what challenges the population faces in their various stopping places. The biggest challenge faced by these birds is in the Delaware Bayshore.

Our biologists use the results of this work to (a) pressure federal and state governments for greater protection and (b) figure out what else they can do to better manage the population.

In fact, our biologists' research lead NJ and Delaware to declare a moratorium on harvesting horseshoe crabs.

This picture was taken in 2001 when this red knot was found brooding chicks. Although her bands aren't visible in this picture, she was banded in Delaware Bay in 2000 and biologists tracked her up to her breeding grounds in the Canadian Arctic. This is what we want to find when researchers go to the Arctic but it is becoming an increasingly more difficult task.

Of note, NATURE will be airing a new program on Feb. 3rd about the plight of the red knot. Tune into PBS on Feb. 3rd to watch CRASH and see some of our biologists in action.

HABITAT RESTORATION

Case Study: bog turtle



One of New Jersey's rarest and highly protected species is the bog turtle. It is a tiny dark turtle with a distinctive patch behind the ear membrane...it is the smallest and most secretive of North America's turtles growing to only about 4.5 inches long as an adult.

The bog turtle is found in disjunct populations across the eastern US...and although the Bog turtle historically occupied all of NJ, by the early 1990's its habitat loss limited its distribution to only certain counties in the state.

Case Study: bog turtle



The bog turtle has very specific habitat needs - they live in limestone fens, sphagnum bogs and wet grassy pastures characterized by soft muddy substrates with good drainage that leaves no more than 4in of water above the surface.

With such specific habitat needs and a relatively low mobility, the bog turtle has a hard time when its habitat is destroyed. Historically fens and wetlands have been drained to become better land for farmers but a habitat restoration project in NJ seeks to recover these historic fens and wetlands.

Case Study: bog turtle



The habitat favored by bog turtle can be created with a program of livestock grazing and habitat management. Bog turtle habitat is usually found on private lands throughout NJ on land that was farmed and may still be farmed today. When a biologist identifies a possible site, they will survey the site and if they determine that there is a high enough potential for bog turtle, they will work with the landowner to develop a management practice that usually entails cutting brush, fencing the property and bringing in livestock to (a) keep the vegetation back and (b) create the wet muddy land that the bog turtles like.

The Conserve wildlife Foundation in partnership with the ENSP currently maintains about 20 grazing sites across the state.

The value of biodiversity

- Direct Use:
 - Food
 - Fiber
 - Fuel
 - Medicine
 - Ecosystem Functions
- Inherent Value



Biodiversity plays a significant role in maintaining our life-support systems including providing us with food, fiber, fuel, and medicine. Also just the act of photosynthesis , cellular respiration, and decomposition of organic materials serves to maintain the balance of oxygen and carbon that permits us to live.

It also has inherent value – it exists and therefore it warrants protection. It has evolved on this planet and we have an ethical obligation to protect it.

Environmental Indicators



In terms of wildlife, The first is that wildlife are environmental indicators...they can tell us when our ecosystems are damaged or when something is present that can cause us damage. The absence of wildlife from otherwise suitable habitat indicates toxins or pollution of some sort while the presence of wildlife in suitable habitat can indicate high environmental quality.

Rachel Carson in her book, *Silent Spring*, provided the impetus for the envtl movement.

Keystone species – species that play a significant role in keeping that ecosystem functioning. Its removal or addition results in a significant shift in composition of the community in which it lives.

Potential Scientific Breakthroughs



Over 57 percent of the 150 drugs most prescribed drugs in the US are derived from natural sources. A medicine used to prevent heart attacks, Integrilin, is derived from rattlesnake venom.

Over 125 pure chemical substances are extracted from plants and animals and used in medicine throughout the world. The pharmaceutical industry uses substances extracted from these sources to provide the medications that help improve our quality and quantity of our lives. Who knows what nature will provide in the future?



We are stewards of the environment. We need to assure that we continue to coexist on this planet. The depletion of our natural resources and the destruction of habitats are a direct result of our actions. It is our responsibility to preserve our natural resources and protect our natural heritage so our children and grandchildren can have a clean and healthy environment. Imagine what the world would be like without eagles or butterflies.

We have an ethical responsibility to preserve living species and we have implemented important regulations to this end such as the Endangered Species Conservation Act, Clean Water Act, Pinelands Protection Act, and the Highlands Water Protection and Planning Act.

Recreation & Quality of Life



The importance of biological diversity for our physical, emotional, intellectual, and spiritual well-being cannot be overstated. The presence of rare animals, along with the ecosystems that they inhabit enrich our lives tremendously. The pleasure we get from exploring and discovering the natural world through birding, fishing, hunting, hiking, boating, etc. engages the human spirit of curiosity and wonderment, regardless of our age.

Ecotourism and Economic Impacts



And this excitement and curiosity, our desire to be in nature, drives a multi-billion dollar tourism industry here in NJ.

The NJ coastal tourism industry is worth over \$21 billion a year and is based on the beauty of the 127 miles of dunes and beaches, the health of the coastal fisheries, and the maintenance of suitable habitat for many of the species that live on and migrate to the Jersey shore. creating even more of a case to protect and preserve rare wildlife and their habitats.

As a singular example, New Jersey's coast is an important, even vital, stop in the global migration of many birds. Delaware Bay shorebird migration viewing opportunities brings \$31 million annually to Cape May County.



So biodiversity does exist in NJ in great abundance and it is of vital importance to our way of life. We just have to look for it and encourage others to look for it.